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Effect of Trap Type on Pitch Moth Trapping in Western Montana

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Sequoia pitch moth, *Synanthedon sequoiae*, (SPM) is a pest that often attacks the boles and large branches of pine trees in tree improvement areas (TIA) and other trees planted off-site. The larvae feed in the cambium of host trees causing trees to produce large pitch masses. Repeated attacks can eventually girdle trees or cause branches or stems to break (Figure 1).

Insecticides have not proven to be effective in reducing impacts from SPM. Management has primarily consisted of excavating and removing larvae from pitch masses, a labor intensive method. Tree wrapping, also labor intensive but less damaging to the tree than removing larvae, has protected trees from SPM attack (Sturdevant et al. 2015, Sturdevant et al. in prep). Pheromone based management techniques such as mass trapping or mating disruption could be more efficient methods. Mass trapping over two years with 0.5 mg commercial lures showed promise in reducing damage between trapped and control blocks (Sturdevant et al., in prep). The objective of this study was to test a stronger lure and different trap types in efforts to find the optimum trap for mass trapping adult SPM.

Figure 1. Lodgepole pine with numerous pitch masses caused by SPM (left) and an infested tree broken at the base where there were numerous pitch masses.

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Methods

The study was conducted at Big Creek TIA located south of Haugen, Montana on the Lolo National Forest (PM, T19N, R30W, sec 33; N47.37764, W115.39731) in lodgepole pine at an elevation of 3,179 feet (Figure 2). Trees ranged in size from 4-9" diameter 4.5' from the ground (d.b.h.). We tested three different trap types—Unitrap (bucket), delta, and wing (Figure 3). The delta and wing traps had sticky bottoms to catch moths and the bucket traps contained a ½ strip of Hercon® Vaportape™ II inside to kill any trapped moths before they could escape. Ten traps of each type were randomly placed about 2 chains apart (132 feet) in a completely randomized design throughout two lodgepole pine blocks. Each trap was baited with 1 mg of the pheromone (Z, Z)-3, 13-octadecadien-1-ol loaded on a rubber septa lure (ChemTica International). Traps were placed on June 9, 2015 and monitored weekly until they were removed on July 10.

A one-way analysis of variance (ANOVA) test was used to detect any significant differences in moths trapped by each trap type.

Figure 2. One of the lodgepole pine blocks used to test different trap types for catching SPM.

Figure 3. Bucket (left), delta (center), and wing (right) traps used to catch SPM.

Results and Discussion

A total of 705 SPMs and 28 Douglas-fir pitch moths (*S. novaroensis*) were caught in all trap types (Figure 4, Table 1). Both species attack lodgepole pine. Total pitch moths caught by trap type were 236 in bucket traps, 244 in delta traps, and 253 in wing traps. There were no significant differences in the number of moths caught in the different trap types.

Figure 4. Orange and black Douglas-fir pitch moth and yellow and black SPM caught in wing trap.

Table 1. Number of SPM and Douglas-fir pitch moths caught in each trap type.

	Bucket Trap	Delta Trap	Wing Trap
Sequoia Pitch Moth	**230**	**235**	**240**
Douglas-fir Pitch Moth	**6**	**9**	**13**
Total	**236**	**244**	**253**

Moths were caught during the first week traps were deployed. Trap catches peaked on June 26 and dropped dramatically by July 10 (Figure 5). Douglas-fir pitch moths were only caught in June.

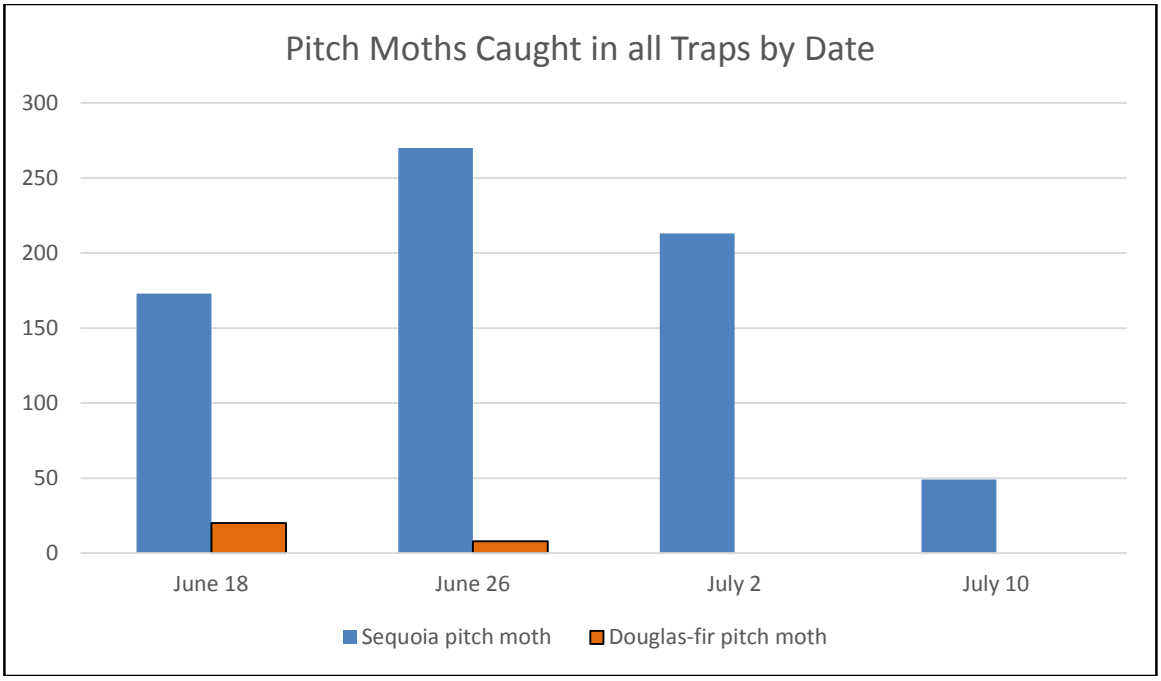

Figure 5. Total pitch moths caught by date in all trap types. Traps were placed June 9.

The results of this test indicate that all three of the trap types tested are effective in catching sequoia pitch moths. Trap types similar to the wing and bucket trap used in this study were equally efficient in trapping the Douglas-fir pitch moth in north central British Columbia (Rocchini et al. 2003). The bucket traps are the most durable and have a higher capacity than the other two trap types but are more expensive. Plastic delta traps and wing trap tops can be used more than one season but sticky liners and trap bottoms need to be replaced multiple times during the flight season as they fill up with moths.

The average number of moths of both species caught per any trap at Big Creek was 24.4 with the 1 mg lure. At a different TIA in Montana, 4.7 SPM were caught per trap in delta traps using a 0.5 mg lure during the same year (Sturdevant et al., in prep). However, trap catches at these two sites may not be directly comparable because of differences in amount of surrounding host type and preexisting population densities.

This test shows that 1 mg lures in three different trap types catch large numbers of SPM. Mass trapping should be less expensive than larval removal and tree wrapping used for SPM management and may result in reducing damage over the life-span of high-value trees in plantations and seed orchards. The pheromone attracts mostly male pitch moths and about 95% of male moths need to be removed from a population in order for mass trapping to be effective in disrupting mating and reducing damage (Dr. Ward Strong, personal communication). This strategy would work best in isolated plantations that do not have immigration of SPM from surrounding pines. Future work is needed to investigate if higher pheromone loads would catch more SPMs within affected areas and if mass trapping or mating disruption for multiple years will reduce SPM damage in lodgepole and ponderosa pine plantations.

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